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EXAMINER	
VERDERAME, ANNA L	

ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/518,144	Applicant(s) SHIONO ET AL.	
	Examiner ANNA L. VERDERAME	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 August 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) *16-28* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 December 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 08/03/2009 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-9, and 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berman et al. US 3,899,333 in view of Greenwood N.N., and Earnshaw A. Chemistry of the Elements. Oxford: Pergamon Press, 1984. 1117-1119., Sha, Jian, Ye, Xisheng, Wang, Zhuangbing, Chen, Bin, and Jiao, Zhengkuan. “Size Effect in the structural phase transition of Nanocrystal Fe_2O_3 and TiO_2.” <u>Chinese Journal of Material Research</u>, 13, 244(1999)., and Lottici, P.P, Bersani, D., Braghani, M., and Montenero, A. “Raman Scattering Characterization of Gel-derived Titania Glass.” <u>Journal of Material Science</u>, 13(1993) 177-183.

Berman et al. teaches a data storage medium comprising a substrate having a radiation sensitive coating consisting essentially of particulate titanium dioxide dispersed in a binder and developable after exposure. The average size of the titanium dioxide particles is about 25 nm(abstract). The substrate is a glass or resin substrate(3/1-7). Binders are disclosed at (2/39-50) and include organic resins which are transparent or translucent. The ratio of TiO2 to binder in the coating may vary between 8:1 to 1:4(2/50-55). Coatings having a thickness of less than 10 mm are preferred(2/62).

In example 1 a coating comprising 25 nm TiO2 particles in a resin binder was formed, the weight ratio of TiO2 particles to binder particles was 4 to 1(3/63- 4/20) The medium was then exposed to a light having a wavelength of 420 nm and was developed(4/49-54).

In example 3 a coating comprising 100 nm TiO_2 particles in a resin binder was formed. The TiO_2 particles made up 10.4 parts by weight. A sensitizing dye was added. The film had a thickness of 4 mm and was exposed using a wavelength of 420 nm.

With regard to the limitations of claims 7-8, the 25 nm and 100 nm TiO_2 particles are shorter than 1/4 of the wavelength of the recording light, 420 nm.

The limitations of claims 5 and 8 are met based on the disclosure to use organic resins which are translucent or transparent. Translucent or transparent materials have a low refractive index.

The limitation of claim 12 is met by the disclosure that the substrate is transparent or translucent and can be made of PET, polyester, cellulose acetate and the like(3/1-6). Based on the overlap between the transparent and translucent resin materials disclosed for use as the binder material and as the substrate material, specifically cellulose acetate, one of ordinary skill in the art would have been motivated to use the same material for both in order to cut down on the number of different materials needed for manufacture. Also, polyvinyl chloride(PVC), disclosed as a suitable binder material is a well known substrate material. Thus the limitation of claim 13 will be met by the disclosure of Berman.

Berman et al. does not explicitly state that the laser beam causes a change in the configuration of TiO_2 as required by claim 1.

Greenwood et al. discloses the TiO_2 exists in three forms at room temperature- anatase, rutile, and brookite, each of these occurs naturally. Rutile is the most stable phase and the others(brookite and anatase) can be converted to rutile upon heating(top of page 1118). Greenwood also shows in table B on page 1119 that the anatase and rutile forms have different refractive indexes. This difference in refractive index serves as the basis in which the information recorded can be read when an anatase type TiO_2 particle is converted to a rutile type TiO_2 particle upon heating. The refractive index of anatase TiO_2 is 2.49-2.55 and the refractive index of rutile TiO_2 is 2.61-2.9

Sha et al. shows the transition from a brookite phase(b-phase) to a rutile phase(r-phase) as a result of an increase in temperature(table 2). This reference illustrates the disclosure found in Greenwood.

Lottici et al. discloses controlled thermal treatment by laser induced heating(abstract). Lottici is used to establish that transformation between crystalline forms can be accomplished by laser-induced heating. The laser is used as a means of heating.

It would have been obvious to one of ordinary skill in the to modify the media of examples 1 or 3 taught by Berman et al. by using either anatase or brookite type TiO_2 particles and selectively heating the particles using a laser beam in order to cause the conversion to rutile type TiO_2 based on the combined disclosure of Greenwood, Sha, and Lottici et al. and with the reasonable expectation of forming recording medium in which exposed/recorded portions, especially in the case where anatase type TiO_2 particles are used, can be differentiated from unexposed/unrecorded portions due to a difference in refractive index.

4. Claims 1-9, 12-13, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozaki et al. EP 0 924 094 and Berman et al. US 3,899,333 in view of Greenwood N.N., and Earnshaw A. Chemistry of the Elements. Oxford: Pergamon Press, 1984. 1117-1119., Sha, Jian, Ye, Xisheng, Wang, Zhuangbing, Chen, Bin, and Jiao, Zhengkuan. " Size Effect in the structural phase transition of Nanocrystal Fe_2O_3 and TiO_2." Chinese Journal of Material Research, 13, 244(1999)., and Lottici, P.P, Bersani, D., Braghani, M., and Montenero, A. "Raman Scattering Characterization of Gel-derived Titania Glass." Journal of Material Science, 13(1993) 177-183.

5. Ozaki et al. teaches a resin-coated support favorably employable as a support of an image recording material formed by mixing and kneading a polyolefin resin with titanium dioxide(abstract). Materials for the support layer are disclosed at (0014) and include those made of synthetic resin films and thermoplastic resin films. The titanium dioxide particles dispersed in the film have a mean particle size of 0.1 to 0.4 micrometers/100-400 nm (0024). The content of titanium dioxide in the film is in the range of 30% to 75% by weight(0028)

In example 1 a film having 15% by weight of anatase-type titanium dioxide having a mean particle size of 0.16 micrometers is formed(0037-0038). Examples of films containing 15-30 parts by weight of TiO_2 are taught in table 1 (0056).

In this example a wavelength of 640nm or greater could be used for recording in order to meet the limitation of claim 8. Recitation of recording wavelength by reciting particle size in terms of the recording wavelength is considered intended use.

The examiner notes that the product claims of the instant application only require generally a medium wherein a recording layer contains titanium dioxide. The method by which information is recorded is not relevant especially since the claims do not recite a recorded medium.

Berman et al. teaches a data storage medium comprising a substrate having a radiation sensitive coating consisting essentially of particulate titanium dioxide dispersed in a binder and developable after exposure. The average size of the titanium dioxide particles is about 25 nm(abstract). The substrate is a glass or resin substrate(3/1-7). Binders are disclosed at (2/39-50) and include organic resins which are transparent or translucent. The ratio of TiO2 to binder in the coating

may vary between 8:1 to 1:4(2/50-55). Coatings having a thickness of less than 10 mm are preferred(2/62).

In example 1 a coating comprising 25 nm TiO2 particles in a resin binder was formed, the weight ratio of TiO2 particles to binder particles was 4 to 1(3/63- 4/20) The medium was then exposed to a light having a wavelength of 420 nm and was developed(4/49-54).

In example 3 a coating comprising 100 nm TiO_2 particles in a resin binder was formed. The TiO_2 particles made up 10.4 parts by weight. A sensitizing dye was added. The film had a thickness of 4 mm and was exposed using a wavelength of 420 nm.

The combination of Berman and Ozaki et al. do not specifically disclose the change in configuration of TiO_2 required by claim 1.

Greenwood et al. discloses the TiO_2 exists in three forms at room temperature- anatase, rutile, and brookite, each of these occurs naturally. Rutile is the most stable phase and the others(brookite and anatase) can be converted to rutile upon heating(top of page 1118). Greenwood also shows in table B on page 1119 that the anatase and rutile forms have different refractive indexes. This difference in refractive index serves as the basis in which the information recorded can be read when an anatase type TiO_2 particle is converted to a rutile type TiO_2 particle upon heating. The refractive index of anatase TiO_2 is 2.49-2.55 and the refractive index of rutile TiO_2 is 2.61-2.9

Sha et al. shows the transition from a brookite phase(b-phase) to a rutile phase(r-phase) as a result of an increase in temperature(table 2). This reference illustrates the disclosure found in Greenwood.

Lottici et al. discloses controlled thermal treatment by laser induced heating(abstract). Lottici is used to establish that transformation between crystalline forms can be accomplished by laser-induced heating. The laser is used as a means of heating.

It would have been obvious to one of ordinary skill in the art to use the resin coated support taught in example 1 of Ozaki having 15% by weight of anatase-type titanium dioxide having a mean particle size of 160 nm for image recording based on the use of similar structures in this manner by Berman et al. and with a reasonable expectation that the anatase TiO_2 particles will be converted to rutile TiO_2 particles upon sufficient heating using a laser.

Again, the instant claims are to a medium comprising a recording layer which contains TiO2. With this rejection the examiner has established that one of ordinary skill in the art would reasonable expect a resin coated substrate like that taught by Ozaki et al. to be capable of recording where the anatase type TiO2 is converted to rutile type upon heating/exposure/recording using a laser beam based on the combined disclosure of Berman, Greenwood, Sha, and Lottici. The claims do not recite the recording method. A medium of this type thus may be capable of recording

using different methods as well as the method recited in the claim and rendered obvious above.

6. Claims 11 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozaki et al. EP 0 924 094 and Berman et al. US 3,899,333 in view of Greenwood N.N., and Earnshaw A. Chemistry of the Elements. Oxford: Pergamon Press, 1984. 1117-1119., Sha, Jian, Ye, Xisheng, Wang, Zhuangbing, Chen, Bin, and Jiao, Zhengkuan. " Size Effect in the structural phase transition of Nanocrystal Fe_2O_3 and TiO_2." Chinese Journal of Material Research, 13, 244(1999)., and Lottici, P.P, Bersani, D., Braghani, M., and Montenero, A. "Raman Scattering Characterization of Gel-derived Titania Glass." Journal of Material Science, 13(1993) 177-183 as applied above and further in view of Alperovich et al. US 2002/0098446.

The combination of Ozaki et al. and Berman et al. in view of Greenwood et al., Sha et al. and Lottici et al. as applied above teaches a layer capable of information recording containing TiO_2 particles dispersed in a polyolefin resin binder. The references do not disclose a multi-layer optical recording medium as recited in instant claims 11 and 14.

Alperovich et al. teaches a multilayer optical recording medium comprising a substrate 101 on which an active layer 112 comprising a fluorescent phase in a thermoplastic polymer, and a quenching phase 103 as a thermoplastic polymer containing a quencher(0045). To obtain a multi-layer disc one layer discs are glued

together in such a way that active layers would alternate with non-active spacing layers on a substrate(0046). The examiner takes the disclosure that the spacing layers are non-active to indicate that they contain neither fluorescent compounds nor quenchers, but contain only polymer. Polymers used for the fluorescence and quenching phases include polyolefins(0076).

Alperovich essentially teaches a multi-layer medium comprising active layers wherein an active compound is dispersed in a polymer matrix and spacing layers containing only polymer. The spacing layers allow for separation of the recording layers and must be transparent in order for recording light to reach further recording layers.

It would have been obvious to one of ordinary skill in the art to modify the single layer medium rendered obvious by the combination of Ozaki et al. and Berman et al. in view of Greenwood et al., Sha et al. and Lottici et al. as applied above comprising TiO_2 particles dispersed in a polyolefin resin matrix by forming a polyolefin spacer layer on the recording layer and laminating a second recording layer comprising TiO_2 particles dispersed in a polyolefin resin matrix thereon with the reasonable expectation of forming a medium having increased recording capacity. A multi-layer medium like that formed by Alperovich can be formed in this manner. Using the same polymer material for the matrix material and for the spacing layers is more economical because you can purchase that material in bulk(usually at a lower price) rather than having to buy smaller quantities of two different materials.

7. Claims 1-8 ,10, 12-13 rejected under 35 U.S.C. 103(a) as being unpatentable over Na et al. US 6,576,589 in view of Greenwood N.N., and Earnshaw A. Chemistry of the Elements. Oxford: Pergamon Press, 1984. 1117-1119., Sha, Jian, Ye, Xisheng, Wang, Zhuangbing, Chen, Bin, and Jiao, Zhengkuan. " Size Effect in the structural phase transition of Nanocrystal Fe_2O_3 and TiO_2." Chinese Journal of Material Research, 13, 244(1999)., and Lottici, P.P, Bersani, D., Braghani, M., and Montenero, A. "Raman Scattering Characterization of Gel-derived Titania Glass." Journal of Material Science, 13(1993) 177-183.

Na et al. teaches two examples(examples 2 and 3) in which an anatase-type TiO_2-SiO_2 layer (67:33 in mol% ratio and 50:50 in mol% ratio respectively) is formed on a glass substrate. Particles size of TiO_2 was found to be 15 nm(5/50) and 12.2 nm(6/24). The film was subjected to a laser having a wavelength of about 250 nm(5/20-6/32).

In this example SiO_2 is the low refractive index inorganic material.

Example 3 in which the TiO_2-SiO_2 is 67:33 meets the limitation of claim 4.

The glass substrate meets the limitations of claims 12-13. When the substrate is transparent recording can be performed from either side of the disc.

Na et al. does not specifically state that irradiation of the TiO_2-SiO_2 layer (67:33 in mol% ratio and 50:50 in mol% ratio respectively) results in the change in configuration of titanium dioxide recited in claim 1.

Na et al. does not specifically disclose the change in configuration of TiO_2 required by claim 1.

Greenwood et al. discloses the TiO_2 exists in three forms at room temperature-anatase, rutile, and brookite, each of these occurs naturally. Rutile is the most stable phase and the others(brookite and anatase) can be converted to rutile upon heating(top of page 1118). Greenwood also shows in table B on page 1119 that the anatase and rutile forms have different refractive indexes. This difference in refractive index serves as the basis in which the information recorded can be read when an anatase type TiO_2 particle is converted to a rutile type TiO_2 particle upon heating. The refractive index of anatase TiO_2 is 2.49-2.55 and the refractive index of rutile TiO_2 is 2.61-2.9

Sha et al. shows the transition from a brookite phase(b-phase) to a rutile phase(r-phase) as a result of an increase in temperature(table 2). This reference illustrates the disclosure found in Greenwood.

Lottici et al. discloses controlled thermal treatment by laser induced heating(abstract). Lottici is used to establish that transformation between crystalline forms can be accomplished by laser-induced heating. The laser is used as a means of heating.

One of ordinary skill in the art would predict that selectively irradiating the (anatase TiO_2)-SiO_2 layer (67:33 in mol% ratio and 50:50 in mol% ratio respectively) of Na et al. in order to sufficiently heat the TiO_2 particles would result in a change in the configuration of the titanium dioxide from anatase to rutile and that based on the disclosure in Greenwood et al. that anatase and brookite TiO_2 have different refractive indexes that the

difference between recorded/heated/irradiated areas would be distinguishable from the unrecorded areas.

The instant claims are to a medium comprising a recording layer which contains TiO_2. With this rejection the examiner has established that one of ordinary skill in the art would reasonable expect a resin coated substrate like that taught by Ozaki et al. to be capable of recording where the anatase type TiO_2 is converted to rutile type upon heating/exposure/recording using a laser beam based on the combined disclosure of Berman, Greenwood, Sha, and Lottici. The anatase and rutile phase are taught in Greenwood to have different refractive indexes. This difference between recorded areas which contain rutile TiO_2 and unrecorded areas which contain anatase TiO_2 allows recorded and unrecorded information to be distinguished from one another. This serves as a basis for reading information in optical recording media. The claims do not recite the recording method. A medium of this type thus may be capable of recording using different methods as well as the method recited in the claim and rendered obvious above.

8. Claims 1-4, 7-8, 12, and 15 rejected under 35 U.S.C. 103(a) as being unpatentable over Furuya et al. WO 00/13178(US 6,759,137 used as an English language translation) in view of Greenwood N.N., and Earnshaw A. Chemistry of the Elements. Oxford: Pergamon Press, 1984. 1117-1119., Sha, Jian, Ye, Xisheng, Wang, Zhuangbing, Chen, Bin, and Jiao, Zhengkuan. " Size Effect in the structural phase transition of Nanocrystal Fe_2O_3 and TiO_2." Chinese Journal of Material Research, 13, 244(1999)., and Lottici, P.P, Bersani, D., Braghani, M., and Montenero, A. "Raman

Scattering Characterization of Gel-derived Titania Glass." Journal of Material Science, 13(1993) 177-183.

Furuya et al. teaches an example wherein a rutile TiO_2 layer having a thickness of 100 nm was formed on a glass substrate. The particles size of the rutile layer was in the range of from 2 nm to 30 nm[(WO pages 10-11)/(US9/25-10/12)]. further teaches formation of a transparent layer on the recording layer[(WO page 9)/(US8/60-63)]. Wavelengths of 700nm or less were used for recording.

Applicant's recites particle size and recording layer thickness in terms of the wavelength of recording light and reproducing light. This is considered intended use.

In this example the either the transparent layer or the glass substrate can corresponds to applicant's protective layer.

Furuya et al. does not explicitly disclose the configurational change required by the claims. The reference also does not teach the limitation of claim 3.

Greenwood et al. discloses the TiO_2 exists in three forms at room temperature-anatase, rutile, and brookite, each of these occurs naturally. Rutile is the most stable phase and the others(brookite and anatase) can be converted to rutile upon heating(top of page 1118). Greenwood also shows in table B on page 1119 that the anatase and rutile forms have different refractive indexes. This difference in refractive index serves as the basis in which the information recorded can be read when an anatase type TiO_2 particle is converted to a rutile type TiO_2 particle upon heating. The

refractive index of anatase TiO_2 is 2.49-2.55 and the refractive index of rutile TiO_2 is 2.61-2.9

Sha et al. shows the transition from a brookite phase(b-phase) to a rutile phase(r-phase) as a result of an increase in temperature(table 2). This reference illustrates the disclosure found in Greenwood.

Lottici et al. discloses controlled thermal treatment by laser induced heating(abstract). Lottici is used to establish that transformation between crystalline forms can be accomplished by laser-induced heating. The laser is used as a means of heating.

It would have been obvious to one of ordinary skill in the art to modify the example taught in Furuya et al. wherein a rutile TiO_2 layer having a thickness of 100 nm was formed on a glass substrate by alternatively forming the TiO_2 layer of anatase or brookite type TiO_2 based on the disclosure in Greenwood that rutile, anatase, and brookite are all naturally occurring forms of TiO_2 and with a reasonable expectation of success that upon sufficient exposure/heating the anatase or brookite form will be converted to a rutile form having a different refractive index based on the combined disclosure of Greenwood, Sha, and Lottici. In this example recording will be caused by a change in configuration from an anatase or brookite type TiO_2 to a rutile type.

9. Claims 1-3, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ichihara et al. US 5,889,756 in view of Greenwood N.N., and Earnshaw A. Chemistry of the Elements. Oxford: Pergamon Press, 1984. 1117-1119., Sha, Jian, Ye, Xisheng, Wang, Zhuangbing, Chen, Bin, and Jiao, Zhengkuan. " Size Effect in the structural phase transition of

Nanocrystal Fe_2O_3 and TiO_2." Chinese Journal of Material Research, 13, 244(1999)., and Lottici, P.P, Bersani, D., Braghani, M., and Montenero, A. "Raman Scattering Characterization of Gel-derived Titania Glass." Journal of Material Science, 13(1993) 177-183.

In example 1 Ichihara et al. teaches an optical recording medium comprising a substrate, a ZnS-SiO_2 layer, a recording layer comprising GeSbTe particles dispersed in a TiO_2 matrix(refractive index 2.2), a ZnS-SiO_2 layer and a reflective layer. GeSbTe content is 71 vol%(7/50-8/26).

In this example ZnS-SiO_2 can be the protective layer recited in instant claim 12.

The recording film containing GeSbTe particles in a TiO_2 matrix corresponds to the titanium-oxide containing recording layer of claim 1. Irradiation using a laser beam is disclosed.

Ichihara et al. does not specifically disclose the configurational change of TiO_2 upon laser irradiation required by claim 1.

Greenwood et al. discloses the TiO_2 exists in three forms at room temperature-anatase, rutile, and brookite, each of these occurs naturally. Rutile is the most stable phase and the others(brookite and anatase) can be converted to rutile upon heating(top of page 1118). Greenwood also shows in table B on page 1119 that the anatase and rutile forms have different refractive indexes. This difference in refractive index serves as the basis in which the information recorded can be read when an anatase type TiO_2 particle is converted to a rutile type TiO_2 particle upon heating. The

refractive index of anatase TiO_2 is 2.49-2.55 and the refractive index of rutile TiO_2 is 2.61-2.9

Sha et al. shows the transition from a brookite phase(b-phase) to a rutile phase(r-phase) as a result of an increase in temperature(table 2). This reference illustrates the disclosure found in Greenwood.

Lottici et al. discloses controlled thermal treatment by laser induced heating(abstract). Lottici is used to establish that transformation between crystalline forms can be accomplished by laser-induced heating. The laser is used as a means of heating.

It would have been obvious to one of ordinary skill in the art to use anatase type or brookite type TiO_2 in the medium taught by Ichihara et al. based on the disclosure in Greenwood et al. that anatase and brookite are two of three naturally occurring forms of TiO_2 and with the reasonable expectation of forming a useful optical recording medium. Further, upon sufficient heating using a laser beam one of ordinary skill in the art would expect the anatase or rutile type TiO_2 to undergo a configurational change to a rutile type having a different refractive index based on the combined disclosure of Greenwood, Sha, and Lottici. This configurational change can serve as the basis for optical recording.

Double Patenting

10. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent

and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

11. Claims 1-9 and 11-15 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-19 of U.S. Patent No. 7,313,080 in view of Greenwood N.N., and Earnshaw A. Chemistry of the Elements. Oxford: Pergamon Press, 1984. 1117-1119., and Sha, Jian, Ye, Xisheng, Wang, Zhuangbing, Chen, Bin, and Jiao, Zhengkuan. " Size Effect in the structural phase transition of Nanocrystal Fe_2O_3 and TiO_2." <u>Chinese Journal of Material Research</u>, 13, 244(1999). The claims in patent 7,313,080 teach a multi-layer medium

comprised of intermediate layer and recording layer wherein the recording layers contain particles dispersed in a particle-holding material. In an example ZnO particles having an average size of 30 nm are dispersed in a UV curing resin. The recording layer having a thickness of 0.13-1 micrometer and a laser having a wavelength of 740 nm is used for recording(16/35-67). This shows that the limitations recited in instant claims 8 and 15 are embraced by the claims of patent 7,313,080. **Use of TiO_2 particles is recited in claim 16 of patent 7,313,080. One would immediately envision an embodiment wherein TiO_2 particles were used instead of ZnO particles based on disclosure in claim 16 of patent 7,313,080.** The claims of patent 7,313,080 do not teach the limitation that the titanium dioxide particles are at least one type selected from anatase type, brookite type and rutile type.

Greenwood et al. discloses the TiO_2 exists in three forms at room temperature- anatase, rutile, and brookite, each of these occurs naturally. Rutile is the most stable phase and the others(brookite and anatase) can be converted to rutile upon heating(top of page 1118). Greenwood also shows in table B on page 1119 that the anatase and rutile forms have different refractive indexes. This difference in refractive index serves as the basis in which the information recorded can be read when an anatase type TiO_2 particle is converted to a rutile type TiO_2 particle upon heating.

Sha et al. shows the transition from a brookite phase(b-phase) to a rutile phase(r-phase) as a result of an increase in temperature(table 2). This reference illustrates the disclosure found in Greenwood.

A layer having anatase or brookite form TiO_2 particles dispersed in a resin binder is inherently capable of being recorded by a change in configuration of the titanium dioxide from an anatase form or a brookite form to a rutile due to sufficient laser heating based on the combined disclosure of Greenwood and Sha et al..

Response to Arguments

The rejections under 35 U.S.C § 102 found at paragraphs 1-6 of the office action mailed on 04/01/2009 are withdrawn.

The teachings of Greenwood, Sha, and Lottici have been added to meet the limitations of amended claim 1.

Berman et al.-

Applicant argues that Berman et al. merely discloses that sensitizing dyes can be combined with titanium dioxide and does not even contemplate changing the state of its titanium dioxide particles. The dyes in Berman are actually used to “alter the spectral response of titanium dioxide to extend the range of photosensitivity thereof from the ultra-violet to the visible or other regions of the spectrum in which the dyes can absorb”. This is found at 3/10-14. In other words the dyes "sensitize" the medium so that the medium can be used with different types of radiation. Further, the examiner has provided the teachings of Greenwood Sha, and Lottici to establish that anatase and brookite forms of TiO_2 can be converted to a rutile form upon heating and that selective heating can occur by the use of a laser beam.

Ozaki et al.-

Applicant argues that in Ozaki et al. "titanium oxide is used as a brightening agent" and then supports this statement with lines from the prior art in Ozaki which discloses that " TiO_2 is combined with a brightener Utivex OB". This portion of the prior art reference does not support applicant's claim that in Ozaki TiO_2 is used as a brightener but instead shows TiO_2 used in combination with a brightener. The applicant has not made it clear how prior art cited in the Ozaki reference helps provide clarity.

Furuya et al.-

The examiner has presented a new rejection using the Furuya et al. reference. The rationale for this rejection can be found in paragraph 8 of this action.

Na et al. -

The examiner has provided Greenwood, Sha, and Lottici to support the conclusion that the media of Na will undergo a configurational change upon sufficient heating with a laser beam.

Ichihara-

Applicant's statement that because Ichihara et al. discloses that the TiO_2 matrix is stable it does not change state is misguided. Ichihara et al. discloses the matrix is stable but never precludes a change of state. Applicant provides no support for this assumption.

Double Patenting rejection:

Applicant's arguments regarding the methods by which the media in the prior art are recorded are irrelevant. The instant claims are to an optical recording medium

having at least one recording layer where the recording layer contains TiO_2. The claims do not even require that any information has actually been recorded. The examiner has provided evidence, through the teachings of Greenwood and Sha et al., that an anatase or brookite type TiO_2 particle can undergo a change to become a rutile type TiO_2 particle having a different refractive index upon heating. Laser recording inherently results in heating.

It would have been obvious to use an anatase or brookite type TiO_2 particles in the medium of patent 7,313,080 and to heat the particles using a laser beam based on the disclosure that TiO_2 exists in three forms and that the anatase and brookite forms can be converted to the rutile form upon heating.

The examiner notes that applicant acknowledges the heating caused by laser irradiation on page 11 of the response(emphasis added).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANNA L. VERDERAME whose telephone number is (571)272-6420. The examiner can normally be reached on M-F 8A-4:30P.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on (571)272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mark F. Huff/
Supervisory Patent Examiner, Art Unit 1795

/Anna L Verderame/
Examiner, Art Unit 1795